

Make-up Exam 3

Cl
35.45

C
12.01

There is only one best answer to each question.

- 1) Carbon tetrachloride has a chlorine-to-carbon mass ratio of 11.8:1. If a sample of carbon tetrachloride contains 20 g of chloride, what mass of carbon does it contain?

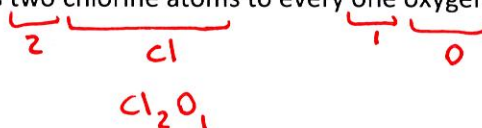
- a. 0.59 g
b. 14.76 g
c. 1.69 g
d. 236 g

CCl₄
First solution: $\frac{Cl}{C} = \frac{11.8}{1} \Rightarrow \frac{20g}{C} = \frac{11.8}{1} \Rightarrow C = \frac{20 \times 1}{11.8} = 1.69g$

Second solution: $? g C = 20 g Cl \times \frac{1 \text{ mol Cl}}{35.45 g Cl} \times \frac{1 \text{ mol C}}{4 \text{ mol Cl}} \times \frac{12.01 g C}{1 \text{ mol C}} = 1.69g$

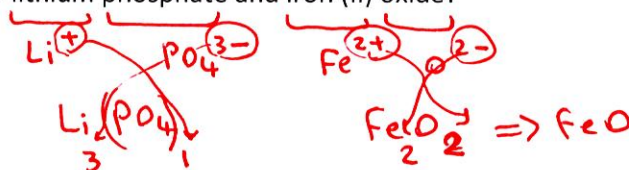
- 2) Write a chemical formula for a compound that contains two chlorine atoms to every one oxygen atom.

- a. ClO₂
b. Cl₂O
c. 2ClO
d. Cl(O₂)₂



- 3) What is the correct chemical formula for lithium phosphate and iron (II) oxide?

- a. Li₃PO₃, Fe₂O₃
b. Li₃PO₄, FeO
c. Li₃PO₄, Fe₂O₃
d. Li₃PO₃, FeO



- 4) What is the formula mass for CCl₂F₂ and hydrobromic acid?

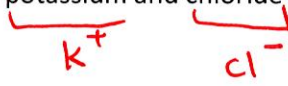
- a. 120.91, 96.91
b. 120.91, 80.91
c. 97.47, 96.91
d. 97.47, 80.91

CCl₂F₂ = (C × 1) + (Cl × 2) + (F × 2) = 120.91 amu
12.01 35.45 19.00

HBr = 1.01 + 79.90 = 80.91 amu

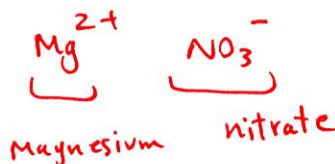
- 5) Write a formula for the compound that forms between potassium and chloride ions.

- a. NaClO₃
b. KClO₃
c. NaCl
d. KCl



- 6) Name the compound Mg(NO₃)₂

- a. Magnesium nitrate
b. Magnesium nitrite
c. Magnesium (X) nitrate
d. Magnesium (X) nitrite



C
12.01

H
1.01

Cl
35.45

F
19.00

Br
79.90

7) Which of the following elements do NOT occur naturally as diatomic molecules?

- a. H
- b. B**
- c. Cl
- d. I

8) Determine the formula mass of Li_3N

- a. 43.81
- b. 34.83**
- c. 48.97
- d. 41.00

$$\text{Li}_3\text{N} = (3 \times \overset{6.94}{\text{Li}}) + (1 \times \overset{14.01}{\text{N}}) = 34.83 \text{ amu}$$

Li
6.94

N
14.01

9) Name the acid HClO_2

- a. Hydrochloric acid
- b. Chlorous acid**
- c. Chloric acid
- d. Hydrochlorous acid

ClO_2^- : chlorite \Rightarrow Base name of polyatomic ion + -ous + acid

10) Name the compound SF_6

- a. ~~Monosulfur hexafluoride~~
- b. Sulfur fluoride
- c. ~~Monosulfur fluoride~~
- d. Sulfur hexafluoride**

11) How many atoms are there in 20 mol argon?

- a. 1.20×10^{21}
- b. 6.022×10^{23}
- c. 1.20×10^{25}**
- d. 1.20×10^{-21}

$$? \text{ atoms} = 20 \text{ mol Ar} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mol Ar}} = 1.20 \times 10^{25} \text{ atoms}$$

12) A sample of pure silver has a mass of 200 g. How many moles of silver are in the sample?

- a. 0.54
- b. 0.98
- c. 1.02
- d. 1.85**

$$? \text{ mol Ag} = 200 \text{ g Ag} \times \frac{1 \text{ mol Ag}}{107.87 \text{ g Ag}} = 1.85 \text{ mol Ag}$$

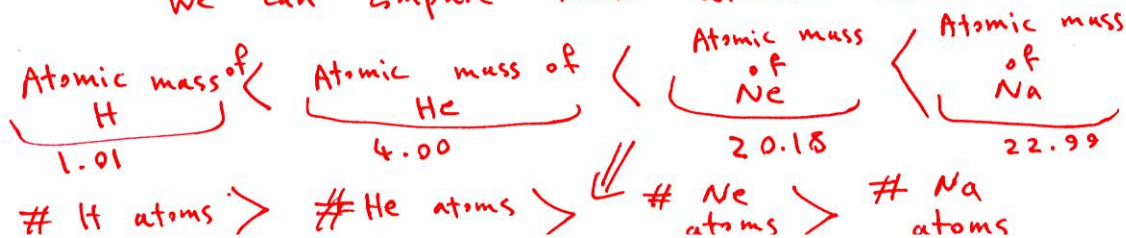
Ag
107.87

13) Which sample contains the largest number of atoms?

- a. 100 g Na
- b. 100 g H**
- c. 100 g He
- d. 100 g Ne

$$? \text{ # atoms} = 100 \text{ g Na} \times \frac{1 \text{ mol Na}}{22.99 \text{ g Na}} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mol Na}}$$

Since the grams are the same in all 4, we can compare their atomic mass.



14) How many moles of N are in 10 mol of $Mg(NO_3)_2$?

- a. 20
- b. 60
- c. 10
- d. This problem cannot be solved with the information provided.

$$? \text{ mol N} = 10 \text{ mol } Mg(NO_3)_2 \times \frac{2 \text{ mol N}}{1 \text{ mol } Mg(NO_3)_2} = 20 \text{ mol N}$$

15) A compound is decomposed in the laboratory and produces 1.40 g N and 0.20 g H. What is the empirical formula of the compound?

- a. NH
- b. N_7H
- c. NH_2
- d. N_2H

$$? \text{ mol N} = 1.4 \text{ g N} \times \frac{1 \text{ mol N}}{14.01 \text{ g N}} = 0.0999 \text{ mol N}$$

$$? \text{ mol H} = 0.20 \text{ g H} \times \frac{1 \text{ mol H}}{1.01 \text{ g H}} = 0.1980 \text{ mol H}$$

N
14.01

H
1.01

16) Which of the following names is correct?

- a. PBr_5 : Phosphorus pentabromide
- b. P_2O_3 : Phosphorus trioxide
- c. SF_4 : Monosulfur hexafluoride
- d. NF_4 : Nitrogen tetrafluoride

Molecular
diphosphorous trioxide

$$\frac{N \ 0.0999}{0.0999} \quad \frac{H \ 0.1980}{0.0999}$$

$$NH_{1.98} \Rightarrow NH_2$$

17) Is the following statement True or False?

Oxyacids are classified into two types, depending on the endings of the oxyanions that they contain.

- a. True
- b. False

anion

18) What is the mass of 5.94×10^{20} H_2O_2 molecules?

- a. 0.033 g
- b. 0.0594 g
- c. 0.001 g
- d. 0.018 g

$$? \text{ g } H_2O_2 = 5.94 \times 10^{20} \text{ } H_2O_2 \text{ molecules} \times \frac{1 \text{ mol } H_2O_2}{6.022 \times 10^{23} \text{ # molecules}}$$

$$\times \frac{(2 \times 1.01) + (16 \times 2) \text{ g } H_2O_2}{1 \text{ mol } H_2O_2} = 0.03356 \text{ g}$$

19) What is the formula mass of $Mg(NO_3)_2$?

- a. 5993.65
- b. 148.33
- c. 86.32
- d. 178.96

$$Mg(NO_3)_2 = (1 \times Mg) + (2 \times N) + (6 \times O) = 148.33 \text{ amu}$$

24.31
14.01
16.00

20) What is the mass percent composition of oxygen in N_2O_5 ?

- a. 25.9 %
- b. 68.6 %
- c. 74.1 %
- d. 29.6 %

$$\text{Mass percent composition of O} = \frac{5 \times 16.00}{(2 \times 14.01) + (5 \times 16.00)} \times 100\% = 74.06\%$$

21) Is the following statement True or False?

A mole has to be a ~~small~~ number because atoms are so ~~large~~.

- a. True ~~large~~ ~~small~~
 b. False

22) What are polyatomic ions?

- a. Ions that are themselves composed of a group of atoms with an overall charge
 b. A ~~metal~~ and one or more nonmetals together in a chemical formula
 c. Two or more ~~cations~~ paired with two or more ~~anions~~
 d. Ions that are themselves composed of a group of atoms with total charge of ~~zero~~

23) Which acid has the higher mass percent composition of O?

- a. HClO₂ a: $\frac{2 \times 16}{(1 \times 1) + (1 \times 1) + (2 \times 16)} \times 100\% = 46.74\%$
 b. HClO₃
 c. H₂SO₄ b: $\frac{3 \times 16}{(1 \times 1) + (1 \times 1) + (3 \times 16)} \times 100\% = 56.83\%$
 d. H₄C₂O₂

24) What is the mass of H in 10 g of H₂SO₄?

- a. 0.40 g $H_2SO_4 = (2 \times 1) + (1 \times 32) + (4 \times 16) = 98.08 \frac{g}{mol}$
 b. 0.10 g
 c. 485.54 g
 d. 0.21 g

? g H = 10 g H₂SO₄ × $\frac{1 \text{ mol } H_2SO_4}{98.08 \text{ g } H_2SO_4} \times \frac{2 \text{ mol H}}{1 \text{ mol } H_2SO_4} \times \frac{1.01 \text{ g H}}{1 \text{ mol H}} = 0.2059 \text{ g} \approx 0.21 \text{ g}$

c: $\frac{4 \times 16}{(1 \times 2) + 32 + (4 \times 16)} \times 100\% = 65.25\%$

d: $\frac{2 \times 16}{(1 \times 4) + (2 \times 12) + (2 \times 16)} \times 100\% = 53.28\%$

25) Which of the following is an empirical formula?

- a. C₆H₁₂O₆ ← Molecular (empirical: CH₂O)
 b. C₄H₄ ← Molecular (empirical: CH)
 c. H₂O₆ ← Molecular (empirical: H₂O)
 d. TiO₂ ← Molecular (empirical: TiO₂)